

EXHIBIT 5

Siddhartha Roy

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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

-----)
) Civil Action No.:
IN RE: FLINT WATER LITIGATION) 5:16-cv-10444-JEL-EAS
)
)
) Hon. Judith E. Levy
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- - -
REMOTE VIDEOTAPED DEPOSITION OF SIDDHARTHA ROY, PH.D.
Monday, May 8, 2023

- - -
Remote videotaped deposition of SIDDHARTHA
ROY, PH.D., commencing at 12:02 p.m., Monday, May 8,
2023, before Juliana F. Zajicek, Registered
Professional Reporter, Certified Shorthand Reporter
and Certified Realtime Reporter.

- - -
GOLKOW LITIGATION SERVICES
877.370.3377 ph | 917.591.5672 fax
Deps@golkow.com

Siddhartha Roy

1 SIDDHARTHA ROY, PH.D.,
2 called as a witness herein, having been first duly
3 sworn, was examined and testified as follows:

4 EXAMINATION

5 BY MR. MORRISSEY:

6 Q. Good afternoon, Dr. Roy.

7 A. Good afternoon.

8 Q. My name is Steve Morrissey. I am one of
9 the lawyers for the Class Plaintiffs in the Flint
10 Water Crisis Litigation.

11 You've been retained as an expert witness
12 by Veolia North America, is that correct?

13 A. Yes.

14 Q. And when were you retained?

15 A. Late last year.

16 Q. Like December of '22?

17 A. Yes.

18 Q. And you then served a report in February
19 of '23?

20 A. Yes.

21 Q. Between when you were retained and when
22 you served your report, you worked about 17 hours on
23 this matter, is that right?

24 A. I'll have to check my invoices.

1 right?

2 A. I have not.

3 Q. Before we get into the substance of your
4 opinions, let me ask you a few questions about your
5 background.

6 You graduated from college at, is it Nirma
7 University in India in 2010?

8 A. Yes.

9 Q. And you studied engineering in college, is
10 that right?

11 A. Yes.

12 Q. You later went on to grad school in
13 engineering at Virginia Tech, is that correct?

14 A. Yes.

15 Q. At Virginia Tech you got a master's in
16 environmental engineering initially, is that right?

17 A. Yes.

18 Q. And then you went on to earn a Ph.D. in
19 civil engineering, is that correct?

20 A. Yes.

21 Q. And who was your Ph.D. adviser?

22 A. Dr. Marc Edwards.

23 Q. And you are currently a research associate
24 at the Water Institute at the University of North

1 Carolina, Chapel Hill, is that right?

2 A. Yes.

3 Q. And you are a licensed engineer in
4 training in the State of Virginia, is that right?

5 A. EIT, yes.

6 Q. And Professor Edwards was your Ph.D.
7 advisor.

8 You studied under him for a number of
9 years, right?

10 A. Yes.

11 Q. You would agree that Professor Edwards is
12 an expert in corrosion science?

13 A. Yes.

14 Q. And you've studied corrosion science as
15 well, right? You've written about that?

16 A. Yes.

17 Q. You worked closely with Professor Edwards
18 in assessing various issues relating to the Flint
19 Water Crisis, correct?

20 A. Some of them, yes.

21 Q. And that was work you personally did and
22 observed, right?

23 A. Yes.

24 Q. And while you were working with Professor

1 A. It just happened that way.

2 Q. All right. Now, your CV also refers to a
3 TED Talk that you gave relating to science in the
4 service of the public good, is that right?

5 A. Yes.

6 Q. And the TED Talk that you gave, was
7 that -- that was a -- a Virginia Tech version of the
8 TED Talk?

9 A. Yes.

10 Q. And the TED Talk related to the water --
11 Flint Water Crisis, right?

12 A. Yes.

13 Q. And let me see if I can -- I'll mark as
14 Exhibit 5 a screen shot of what I believe is a
15 presentation you gave there.

16 (WHEREUPON, a certain document was
17 marked Siddhartha Roy, Ph.D.
18 Deposition Exhibit No. 5, for
19 identification, as of 05/08/2023.)

20 BY MR. MORRISSEY:

21 Q. Do you recognize this slide as one that
22 you used at the TED Talk?

23 A. (Nodding head.)

24 Q. And the quoted language on the slide, you

1 recognize that, right?

2 A. Yes.

3 Q. And what is it?

4 A. It's the -- it is an abridged version of
5 the First Canon of the Code of Ethics for the American
6 Society of Civil Engineers.

7 Q. The National Society of Professional
8 Engineers, right, as well?

9 A. As well, yes.

10 Q. And both bodies have a similar ethical
11 principle, correct?

12 A. The -- this canon is similar between the
13 both of them.

14 Q. Do you believe it's important for
15 engineers to uphold this principle of holding
16 paramount the safety, health, and welfare of the
17 public?

18 MR. RINGSTAD: Objection; form, scope.

19 BY THE WITNESS:

20 A. Yes.

21 BY MR. MORRISSEY:

22 Q. You would agree, wouldn't you, that a
23 failure to act in accordance with this standard can
24 result in harm to people, property, and businesses?

1 MR. RINGSTAD: Objection; form, scope.

2 BY THE WITNESS:

3 A. It depends.

4 BY MR. MORRISSEY:

5 Q. Just as a general matter, you would agree
6 that a failure to act in accordance with this
7 principle can result in harm to people, property, and
8 businesses?

9 MR. RINGSTAD: Objection; form, scope,
10 incomplete hypothetical.

11 BY THE WITNESS:

12 A. In a general hypothetical case, it can.
13 (WHEREUPON, a certain document was
14 marked Siddhartha Roy, Ph.D.
15 Deposition Exhibit No. 6, for
16 identification, as of 05/08/2023.)

17 BY MR. MORRISSEY:

18 Q. What I'm marking as Exhibit 6 is a copy of
19 the TED Talk you gave at Virginia Tech. I've brought
20 it forward to 5:48 on the timestamp and I'm going to
21 play this and then ask you whether -- ask you some
22 questions about it.

23 That's you on the screen there, right?

24 A. Yes.

1 Q. And this is a -- an image taken during the
2 TED Talk you gave at Virginia Tech -- Tech, right?

3 A. Yes.

4 (Audio played, as follows:

5 Now, contrast that to the first
6 canon of engineering, which in my
7 opinion should be the first law of
8 humanity, to hold paramount the
9 health, safety, and welfare of the
10 public above all else. This is the
11 Hippocratic Oath we've rarely
12 acknowledged, let alone embraced.
13 And so when scientists and engineers,
14 very much like medical doctors, screw
15 up, people can get hurt, even die.
16 If our professionals and even
17 students fail to get that, society
18 pays a huge price.)

19 BY MR. MORRISSEY:

20 Q. Those were your words, right?

21 A. Yes.

22 Q. And you still agree with the statements
23 you gave at your TED Talk, don't you?

24 MR. RINGSTAD: Objection; form.

1 BY THE WITNESS:

2 A. With the -- with the portion you played,
3 yes.

4 BY MR. MORRISSEY:

5 Q. You still agree that when engineers screw
6 up, people can get hurt or even die, right?

7 MR. RINGSTAD: Objection; form, scope,
8 incomplete hypothetical.

9 BY THE WITNESS:

10 A. In a general hypothetical case, yes.

11 BY MR. MORRISSEY:

12 Q. Yes. And your TED Talk was about the
13 Flint Water Crisis, right?

14 A. It was partly about the Flint Water
15 Crisis, yes.

16 Q. Your report attaches as exhibits two of
17 your published articles relating to the Flint Water
18 Crisis, correct?

19 A. Yes.

20 (WHEREUPON, a certain document was
21 marked Siddhartha Roy, Ph.D.
22 Deposition Exhibit No. 7, for
23 identification, as of 05/08/2023.)

24 BY MR. MORRISSEY:

1 methods?

2 BY MR. MORRISSEY:

3 Q. Yes. You are knowledgeable of standard
4 methods for assessing water corrosivity, aren't you?

5 A. Not all of them.

6 Q. You are familiar with something called the
7 chloride sulfate mass ratio, aren't you?

8 A. Yes.

9 Q. And the chloride sulfite mass ratio is
10 often abbreviated as CSMR, is that right?

11 MR. RINGSTAD: Objection; form, and it is
12 sulfate.

13 MR. MORRISSEY: Thank you.

14 BY MR. MORRISSEY:

15 Q. The chloride sulfate mass ratio is often
16 abbreviated as CSMR, is that right?

17 A. Yes.

18 Q. And is the CSMR used to assess water
19 corrosivity?

20 A. It is used sometimes.

21 Q. In what circumstances?

22 MR. RINGSTAD: Objection; form.

23 BY THE WITNESS:

24 A. My understanding is it helps understand

1 galvanic corrosion better.

2 BY MR. MORRISSEY:

3 Q. What do you mean by that?

4 A. Galvanic corrosion occurs when there are
5 two dissimilar metals are in contact which leads to
6 selective leaching of metal from, like, one of the two
7 metals.

8 Q. Can the CSMR be used to assess the risks
9 of corrosion in a water distribution system like the
10 one in Flint?

11 MR. RINGSTAD: Objection; form.

12 BY THE WITNESS:

13 A. You can look at it, yes.

14 BY MR. MORRISSEY:

15 Q. Did you learn anything about the CSMR in
16 Flint during your work there?

17 A. Just that it changed after the switch to
18 the Flint River.

19 Q. And by "it changed," you mean it
20 increased, right?

21 A. Yes.

22 Q. And did you draw any inference based on
23 your experience from the fact the CSMR increased as to
24 whether that increase resulted in a risk of corrosion?

1 MR. RINGSTAD: Objection; form, scope.

2 BY THE WITNESS:

3 A. Yes.

4 BY MR. MORRISSEY:

5 Q. And your conclusion was that the increase
6 in the CSMR resulted in an increased risk of
7 corrosivity, right?

8 MR. RINGSTAD: Objection; form, scope.

9 BY THE WITNESS:

10 A. It helped explain the lead levels we were
11 seeing.

12 BY MR. MORRISSEY:

13 Q. What do you mean by that?

14 A. In the August 2015 sampling, the water
15 lead levels that we saw, they were -- the 90th
16 percentile was 27 parts per billion above the federal
17 action level. That was -- you know, so that could be
18 explained partially -- or, you know, that was one
19 explanation. CSMR was, you know, one of the
20 explanations of -- of the lead levels we were seeing.

21 Q. Did you and your team calculate CSMR
22 yourselves?

23 A. I think Dr. Edwards did.

24 Q. Do you know when he did that?

1 A. I do not.

2 Q. Did you see the results of his
3 calculation?

4 A. The final number, yes.

5 Q. And that was a -- a number from
6 August 2015?

7 MR. RINGSTAD: Objection; form.

8 BY THE WITNESS:

9 A. Yes, August, September 2015.

10 BY MR. MORRISSEY:

11 Q. All right. So let me see if I can break
12 this down.

13 You and Professor Edwards were in Flint in
14 August 2015 doing water sampling, right?

15 A. I personally was in Flint in
16 September 2015.

17 Q. Were you there in August?

18 A. No.

19 Q. All right. But you were involved in this
20 project of water sampling in Flint in August,
21 September 2015, right?

22 A. Yes.

23 Q. And as part of that project, your team
24 took water samples from people throughout the City of

1 Flint, is that right?

2 A. We sent sampling kits to residents. We
3 had collected samples.

4 Q. So your team collected samples. These
5 samples were taken citywide, is that right?

6 A. Homes, yes, throughout the city.

7 Q. And the 90th percentile level you found in
8 those samples was around 27 parts per billion of lead,
9 is that right?

10 A. That sounds correct.

11 Q. And 27 parts per billion is nearly twice
12 the action level for water lead levels, is that right?

13 A. The action level is 15, so 27 is -- fair,
14 yes.

15 Q. And you, upon seeing those high lead
16 levels, you were concerned, right?

17 A. Yes.

18 Q. And why were you concerned about these
19 high lead levels?

20 A. Because that can cause harm and it was
21 in -- in the water.

22 Q. Lead can cause harm to people who consume
23 lead, right?

24 A. It can cause harm.

1 Q. And apart from -- do you know what kinds
2 of harm lead can cause people?

3 A. From my reading of the literature, you
4 know, cognitive issues, other organ systems, with
5 cognitive systems it can cause loss in IQ points. It
6 is a big -- there is a long list, but those are the
7 obvious ones I can think of.

8 Q. And is it your understanding that the
9 risks from lead exposure are particularly acute in
10 children?

11 A. Yes.

12 Q. So your team collected these samples, you
13 got the results, they showed that the water lead
14 levels were 27 parts per billion, you're concerned
15 because the risk of harm to people.

16 Is that a fair summary?

17 A. Yes.

18 Q. And you wanted to figure out why is this
19 happening, right?

20 A. Yes.

21 Q. And as part of that process, you
22 considered whether there had been some change to the
23 CSMR, correct?

24 A. Our team did.

1 Q. And your team concluded there had been a
2 change to the CSMR and that that was a cause of the
3 problem, right?

4 MR. RINGSTAD: Objection; form.

5 BY THE WITNESS:

6 A. It could be one of the explanations, yes.

7 BY MR. MORRISSEY:

8 Q. All right. And, well, it wasn't just that
9 it could be one of the explanations. Didn't you reach
10 the conclusion that the switch to high CSMR water was
11 a significant contributing factor in the increased
12 corrosivity and lead leaching into the water?

13 MR. RINGSTAD: Objection; form, scope.

14 BY THE WITNESS:

15 A. It had been -- it is my understanding that
16 it was the switch to the Flint River water with high
17 chloride and the interruption of -- of adding
18 orthophosphates.

19 BY MR. MORRISSEY:

20 Q. I was going to get to that next.

21 Do you -- did you also learn something
22 about whether Flint had a corrosion control system in
23 place in August 2015?

24 A. My understanding was that when they made

1 the switch, they stopped adding -- adding

2 orthophosphate.

3 Q. And when did you learn that?

4 A. Same timeframe, August, September, you

5 know, mid 2015, August, September.

6 Q. So in August, September 2015 you learned

7 the City had switched to this high CSMR level water

8 and they had interrupted their corrosion control,

9 correct?

10 A. The water had high CSMR and no

11 orthophosphate, yes.

12 Q. And did you conclude those were problems

13 from an engineering perspective?

14 MR. RINGSTAD: Objection; form, scope.

15 BY THE WITNESS:

16 A. Our team did.

17 BY MR. MORRISSEY:

18 Q. Right. Your -- your team is lead by

19 engineers, right?

20 A. Doctor -- yes, yes.

21 Q. And how long did it take your team to

22 figure out that this switch to CS -- high CSMR water

23 without corrosion control was a problem?

24 MR. RINGSTAD: Objection; form.

1 A. Oh, no, not the regulator, no, no. What I
2 meant was you -- you do experiments that, you know,
3 proven either way if the switch will have an effect.

4 Q. Right. And from an engineering
5 perspective to determine whether switching a water
6 source and interrupting corrosion control is going to
7 lead to corrosivity problems and harm to people and
8 property, you need to do something called an optimized
9 corrosion control treatment study, right?

10 MR. RINGSTAD: Objection; form, scope.

11 BY THE WITNESS:

12 A. A corrosion control study, yes.

13 BY MR. MORRISSEY:

14 Q. And there is something called an OCCT?

15 A. Optimal -- yes, they optimize it, yes.

16 Q. And that's something that engineers
17 working on -- with the water distribution system
18 that's switching its sources are supposed to do as a
19 matter of practice, right?

20 MR. RINGSTAD: Objection; form, scope.

21 BY THE WITNESS:

22 A. My understanding is whenever you, you
23 know, make any changes to treatments, you do
24 experiments.

1 BY MR. MORRISSEY:

2 Q. And that was something that was known and
3 done well before 2014, correct?

4 MR. RINGSTAD: Objection; form, scope.

5 BY THE WITNESS:

6 A. Where?

7 BY MR. MORRISSEY:

8 Q. Throughout the country apart from Flint.

9 A. I hope so. I don't know.

10 Q. You've referenced OCCTs in some of your
11 published articles, right?

12 A. Right.

13 Q. And you are familiar with that standard
14 practice of conducting an OCCT before completing a
15 switch in sources, aren't you?

16 A. I'm familiar with the need for doing
17 experiments before you, absolutely, make any switch.

18 Q. Right. And you know that that was
19 something that was known to engineers generally before
20 2014, fair?

21 A. Yeah, doing studies before making a
22 switch, yes.

23 Q. You -- we've touched on the harms to
24 people that can result from exposure to lead in

1 drinking water. Let me touch on a different category
2 of potential harm.

3 Would you agree that corrosion --
4 corrosivity in drinking water can result in harm to
5 property?

6 MR. RINGSTAD: Objection; form, scope.

7 BY THE WITNESS:

8 A. Can you expand on the harm to property?

9 BY MR. MORRISSEY:

10 Q. Fair. Corrosive water can damage pipes
11 and fixtures, right?

12 A. When you say "damage," do you mean
13 increased release?

14 Q. Yeah, put holes in them, make water leak
15 out.

16 A. Yes.

17 Q. And corrosive water, apart from the lead
18 that's in service lines in a distribution system,
19 there is also lead in brass fixtures, correction?

20 A. Some brass fixtures, yes.

21 Q. And -- and there is also lead in solders
22 in water distribution systems like the one in Flint,
23 correct?

24 A. You have lead solder typically inside a

1 directing you to your report, your February report
2 which is Exhibit 1. If you could go to Paragraph 18,
3 Page 7.

4 Are you there?

5 A. Yes.

6 Q. You write there:

7 "The City of Flint switched its water
8 supply from Lake Huron water with orthophosphate via
9 Detroit Water and Sewage Authority (now, Great Lakes
10 Water Authority) to the local Flint River water
11 without orthophosphate on April 25th, 2014."

12 Correct?

13 A. Yes.

14 Q. And it is your understanding that's what
15 happened, right?

16 A. Yes.

17 Q. Orthophosphate is a form of corrosion
18 control, correct?

19 A. Yes.

20 Q. You would agree that corrosion control is
21 important in a water distribution system, right?

22 A. Generally, yes.

23 Q. And the Flint water distribution system
24 had characteristics that made corrosion control

1 particularly important, correct?

2 A. Do you mean lead pipes?

3 Q. Lead pipes is one, right, if a -- if a
4 water distribution has lead pipes, that's a reason to
5 be particularly concerned about corrosion control,
6 fair?

7 A. Yes.

8 MR. RINGSTAD: Objection; form.

9 BY MR. MORRISSEY:

10 Q. The Flint water distribution system was
11 making a switch from a water source where there was
12 corrosion control in place to one where there were
13 high levels of chlorides, right?

14 A. The Flint River had high levels, high
15 levels of chloride.

16 Q. Right. And a switch to a water source
17 that's more corrosive is a reason to focus on
18 corrosion control, isn't it?

19 A. You do it before the switch.

20 Q. Yes.

21 A. You do experiments before switching.

22 Q. Yes.

23 A. Yes.

24 Q. And the fact -- the fact that the new

1 source was potentially significantly more corrosive is
2 a reason why those experiments are particularly
3 important, isn't it?

4 A. You do the experiments whether there is a
5 concern or not.

6 Q. Right. And the failure to do those
7 experiments can be a big problem if the water is going
8 to be more corrosive afterwards, right?

9 MR. RINGSTAD: Objection; form.

10 BY THE WITNESS:

11 A. If I learned anything from Flint, do the
12 experiment before you do anything, yes.

13 BY MR. MORRISSEY:

14 Q. Right. And if you learned sometime after
15 the fact that those experiments hadn't been done,
16 you'd recognize that was a problem, right?

17 MR. RINGSTAD: Objection; form.

18 BY THE WITNESS:

19 A. Yes.

20 BY MR. MORRISSEY:

21 Q. And how long would it take you, based on
22 your experience in engineering, to realize that not
23 having done those experiments was a problem?

24 A. My understanding is it is required by

1 federal law, so if -- if I find out that the federal
2 law was not followed, then you know that it has not
3 been done.

4 Q. So it would be immediately upon learning
5 that fact, you would know there was a problem, fair?

6 MR. RINGSTAD: Objection; form.

7 BY THE WITNESS:

8 A. A problem in that the experiments were not
9 done.

10 Q. You would agree that as an engineering
11 matter in designing and managing a water distribution
12 system, you'd want to minimize the risk of lead
13 exposure, right?

14 MR. RINGSTAD: Objection; form.

15 BY THE WITNESS:

16 A. You are bound by the Lead and Copper Rule,
17 so you should be following the Lead and Copper Rule.

18 BY MR. MORRISSEY:

19 Q. That's a separate question.

20 Putting aside the Lead and Copper Rule,
21 you'd agree, there is no safe level of lead, is there?

22 A. The CDC official language is no safe level
23 of lead has been identified.

24 Q. Right. And the CDC has suggested that

1 had a press conference on, I think, September '15.

2 Q. And what was the purpose of that press
3 conference?

4 A. To share findings from the -- the water
5 sampling on our part and I think residents and the
6 ACLU had -- had many of their demands as well.

7 Q. Did you believe it was important to share
8 your findings publicly?

9 A. Yes.

10 Q. Why?

11 A. The 90th percentile lead level was above
12 the action level in our sampling.

13 Q. So the lead levels that you were seeing in
14 August of -- and September 2015 were high, right?

15 A. The 90th percentile was above the action
16 level.

17 Q. And you were concerned that those high
18 lead levels could cause harm to people in Flint,
19 right?

20 A. Yes.

21 Q. And you thought it was important to warn
22 everyone, right?

23 A. After watching MDEQ and EPA not respond to
24 calls for help, yes.

Siddhartha Roy

1 Q. You mentioned MDEQ and EPA.

2 To your knowledge, Veolia didn't warn

3 anyone, did they, you are not aware of Veolia warning

4 anyone, are you?

5 MR. RINGSTAD: Objection; form.

6 BY THE WITNESS:

7 A. I don't know anything about what Veolia

8 did or did not do.

9 BY MR. MORRISSEY:

10 Q. Okay. But you, as an engineer who had

11 been there along with your colleague Professor

12 Edwards, thought it was important to warn everyone,

13 right?

14 A. Based on the numbers, yes, and the

15 actions -- inactions of EPA and MDEQ, absolutely.

16 Q. And you've described what you found at the

17 time as a very significant lead problem, correct?

18 A. I personally?

19 Q. Yes.

20 A. We posted something, language similar to

21 that I think on the Flint website.

22 Q. This is back to Exhibit 7. This is your

23 article from Water Research?

24 A. Yes.

1 Q. Do you see that?

2 A. Yes.

3 Q. And if we turn to Page 480, there is a
4 statement saying that your citywide sampling event in
5 August 2015 did detect a very significant lead
6 contamination problem, right?

7 A. It cites the calcium Pieper article too,
8 yes.

9 Q. Right. So you've said in peer-reviewed
10 articles that what you found in your sampling in
11 August 2015, your citywide sampling, was a very
12 significant lead contamination problem, correct?

13 A. Yes.

14 Q. And as you testified earlier, the level of
15 lead was almost twice the action level, right, 27?

16 A. Twenty-seven.

17 Q. And it was around the same time that you
18 learned about the fact there had not been an optimized
19 corrosion control study, is that right?

20 A. At the time I don't think I knew if a
21 study was done or not, just that the switch happened
22 and no orthophosphate was in the water.

23 Q. So at some point in around the same
24 timeframe you learned there were no orthophosphates

1 being used to control corrosion, correct?

2 A. Yes.

3 Q. What was your reaction when you learned

4 about the state of corrosion control in Flint?

5 MR. RINGSTAD: Objection; form.

6 BY THE WITNESS:

7 A. I was curious about why it was not

8 included or was not being added.

9 BY MR. MORRISSEY:

10 Q. Curious. Anything else?

11 A. Yeah. Why was orthophosphate not being

12 added.

13 Q. Were you surprised?

14 A. I was puzzled, yeah.

15 Q. Were you concerned about the lack of

16 orthophosphates in the system?

17 MR. RINGSTAD: Objection; form.

18 BY THE WITNESS:

19 A. And this was when we -- when we were doing

20 the sampling?

21 BY MR. MORRISSEY:

22 Q. Yes.

23 A. Yeah, I read Mr. Del Toral's memo at the

24 time that talked about no phosphate -- no phosphate

1 and so I was -- I was -- I was -- yeah, I was -- I was
2 curious why federal law was not followed.

3 (WHEREUPON, a certain document was
4 marked Siddhartha Roy, Ph.D.
5 Deposition Exhibit No. 15, for
6 identification, as of 05/08/2023.)

7 BY MR. MORRISSEY:

8 Q. What I'm marking as Exhibit 15 is another
9 e-mail exchange from Professor Edwards to Mr. Glasgow
10 and Walling dated September 10th, 2015.

11 Now, Professor Edwards wrote in that
12 e-mail:

13 "...if MDEQ had required corrosion control
14 like the law requires, we'd not be in this mess right
15 now."

16 Do you see that?

17 A. I do.

18 Q. And do you agree with Professor Edwards
19 that corrosion control was something the law required?

20 MR. RINGSTAD: Objection; form.

21 BY THE WITNESS:

22 A. Yes.

23 BY MR. MORRISSEY:

24 Q. And Professor Edwards conveyed this

Siddhartha Roy

1 the two waters."

2 Right?

3 A. I see that.

4 Q. There is then a reference to an
5 experiment: When we visited Flint, we took pieces of
6 copper pipe joined with lead solder inside them.

7 Were you involved in the analysis of the
8 pipes?

9 A. No.

10 Q. Do you know who did that?

11 A. I do not.

12 Q. It was part of your team's work?

13 A. Yes.

14 Q. And you saw the results?

15 A. Yes.

16 Q. And you reported them on the website you
17 maintained?

18 A. My -- I think folks at -- I think Marc
19 wrote the article and I posted it on the website.

20 Q. All right. If we go further down the
21 chain under Results and Observations, there is a
22 statement that:

23 "On average Detroit water is 19 times less
24 corrosive than the Flint water" -- "Flint River water

1 currently in use. That is, the current Flint River
2 water leaches 19 times more lead to the water than
3 Detroit water. This explains why the...lead in
4 Flint's water in our survey, is so high, even when it
5 was low before when Detroit water was being used."

6 Right?

7 A. I see that.

8 Q. And that was a conclusion that your team
9 reported based on its work in August '15?

10 A. From the experiments, yeah.

11 Q. And then a couple of paragraphs down:

12 "Orthophosphate still does not seem to
13 help stop lead leaching in Flint River water, which is
14 also consistent with expectations...based on
15 experiments in high chloride water."

16 Do you see that?

17 A. I do.

18 Q. So there are -- there is some water
19 sources that are so high in chlorides that even
20 orthophosphates won't control corrosivity, correct?

21 MR. RINGSTAD: Objection; form.

22 BY THE WITNESS:

23 A. That's what the e-mail says. I haven't
24 looked at the link.

1 BY MR. MORRISSEY:

2 Q. Right. But that's something that you --
3 your team reported at the time, right?

4 A. Yes.

5 Q. And then continuing down under

6 Conclusions:

7 "This is creating a public health threat
8 in some Flint homes that have lead pipe or lead
9 solder. Unfortunately, adding orthophosphate
10 corrosion inhibitor to the Flint water" -- "River
11 water, does not solve the lead problem."

12 Do you see that?

13 A. I do.

14 Q. And that was also something your team
15 reported?

16 A. Based on the ongoing experiment, yes.

17 Q. And then, continuing in this e-mail in
18 which you are acknowledged as a contributor, do you
19 know what -- what role -- do you know what the
20 acknowledgment was for?

21 A. Formatting and grammar mostly.

22 Q. But you were -- so did you write the
23 e-mail?

24 A. Oh, no.

1 Q. Continuing down here in the paragraph that
2 begins "Likewise," the e-mail reads:

3 "...we are finding very high lead in other
4 homes with modern lead free plumbing which again
5 points to city owned lead pipes and corrosive water as
6 the problem."

7 That is something your team reported to
8 the City, correct?

9 A. Yes.

10 Q. He then continues:

11 "We stand by our recommendation to Flint
12 consumers, that they immediately reduce their exposure
13 to high lead in Flint's water by implementing
14 protective measures when using tap water for drinking
15 or cooking."

16 That's a recommendation your team made to
17 the City in September '15, correct?

18 A. Yes.

19 Q. There is then Step 2 in the e-mail. It
20 suggests implementing corrosion control?

21 A. Yes.

22 Q. And reads:

23 "The second step will ultimately require
24 some sort of corrosion control treatment to reduce

1 lead in Flint water."

2 Do you see that?

3 A. Yes.

4 Q. And you agreed with that statement that
5 Professor Edwards communicated to the City, correct?

6 A. Like, all of it?

7 Q. Sure. Well, I'm going to ask you a series
8 of questions, so if it is more helpful to break it
9 down, we can go one at a --

10 A. Please.

11 Q. All right. So he goes through three
12 options, either switching back to non-corrosive
13 Detroit water, adding orthophosphate or waiting for
14 the pipeline.

15 Do you see that?

16 A. Yes.

17 Q. And you'd agree, those were three
18 alternatives that your team considered, correct?

19 A. Yes.

20 Q. And the first of those, switching back to
21 the non-corrosive Detroit water, Professor Edwards
22 writes:

23 "It is our opinion, based on years of
24 experience, that Flint's lead levels would drop

1 the press conference, I think. I couldn't talk, but I
2 saw him. The day before there was a City Council
3 meeting and -- where Mr. Walling and Mr. Croft and
4 others gave presentations and I attended it. So I saw
5 them -- I didn't meet them personally, but I saw them
6 giving talks -- you know, talking about the water and
7 other, you know, on -- on the stage.

8 Q. Did you ever speak personally with any of
9 those people, either in person or by phone?

10 A. No.

11 Q. Over the course of your team's work, did
12 you learn at some point that private engineers from
13 LAN had blessed the distribution system before the
14 switch was made?

15 MR. RINGSTAD: Objection; form.

16 BY THE WITNESS:

17 A. I knew the name LAN, that they were
18 involved. That was it.

19 BY MR. MORRISSEY:

20 Q. You didn't look at any of their work or
21 make any assessment of it at any time?

22 A. No.

23 Q. And with respect to Veolia, did you learn
24 at some point in this August/September period that

1 they had been retained by the City earlier in 2015?

2 A. I don't recall if it was then, but then
3 eventually, of course, I learned about the fact that
4 Veolia was involved.

5 Q. But you never conducted any assessment or
6 evaluation or study into Veolia's work and whether it
7 comported with the standards applicable to engineers,
8 fair?

9 A. I did not.

10 Q. I am now marking as the next
11 exhibit Exhibit 17.

12 (WHEREUPON, a certain document was
13 marked Siddhartha Roy, Ph.D.
14 Deposition Exhibit No. 17, for
15 identification, as of 05/08/2023.)

16 BY MR. MORRISSEY:

17 Q. This is an e-mail exchange that -- it
18 begins with a -- a lengthy e-mail from -- well, first
19 there is an e-mail from -- strike that.

20 There is an e-mail from Professor Edwards
21 to a group of folks at the EPA dated September 20th,
22 2015.

23 Do you see that?

24 A. Yes.

1 Q. You agreed in September 2015 that there
2 was a crisis situation in Flint, right?

3 A. Lead levels above the action level.

4 Q. And you thought Flint should switch back
5 to Detroit water and implement corrosion control as
6 soon as possible, right?

7 A. Take action to protect Flint residents.

8 Q. And specific actions your team recommended
9 were switching back to Detroit water and implementing
10 corrosion control, correct?

11 A. That was one of the three options, I
12 think, that Marc laid out.

13 Q. And that was the option your team
14 suggested was the best way to protect the health of
15 people in Flint, wasn't it?

16 MR. RINGSTAD: Objection; form.

17 BY THE WITNESS:

18 A. Based on what was known at the time, yes.

19 BY MR. MORRISSEY:

20 Q. After your team made your recommendations,
21 Flint implemented corrosion control and switched back
22 to Detroit water, correct?

23 A. I wish they had.

24 Q. Well, they did, didn't they?

1 Q. But in terms of the getting the water back
2 to levels that met safe drinking water standards,
3 switching back to Detroit water and implementing
4 corrosion control were important, right?

5 MR. RINGSTAD: Objection; form.

6 BY THE WITNESS:

7 A. It was a combination of tripling the
8 orthophosphate dose and replacement of the -- of the
9 lead in the galvanized pipes.

10 BY MR. MORRISSEY:

11 Q. And switching the source?

12 A. Yes.

13 Q. In your 2019 peer-reviewed article that's
14 Exhibit 7, this is the one from Water Research.

15 Do you have that one there?

16 A. I do.

17 Q. In your Figure 1 on Page 478, you have a
18 graphic that shows changes in what over time?

19 A. Well, in the mass biosolids, temperature,
20 there were several children with blood lead above
21 5 micrograms per deciliter and cadmium mass levels.

22 Q. And if we turn to Page 481, on 481 there
23 is a series of bullet points in the left-hand column
24 under Conclusions. And the fourth one from the top

1 refers to: "Summer spikes of WLL."

2 That's water lead levels, right?

3 A. You said the fourth point?

4 Q. Fourth from the bottom. Sorry.

5 A. From the bottom. Thank you.

6 Yes.

7 Q. "WLL" is water lead levels. And your
8 analysis of biosolids found summer spikes in water
9 lead levels in both 2014 and 2015, correct?

10 A. The bulk, that was in 2014, yes.

11 Q. My question was, did you find summer
12 spikes in both 2014 and 2015?

13 A. Let me look at the graph.

14 Q. Let's stick with the bullet point for now,
15 sir. Your bullet point reads:

16 "Summer spikes of WLL occurred when
17 orthophosphate was not added to water in 2014 and
18 2015, but not in pre-FWC or post-FWC summer months
19 when orthophosphate was being dosed."

20 Those are your words from your
21 peer-reviewed article, correct?

22 A. Yes.

23 Q. Okay. Now we can go back to the graph
24 that you were moving towards.

1 If we look at the graph, you see the
2 yellow line in the middle of the yellow blocked
3 section of the graph, correct?

4 A. Yes.

5 Q. The upward trend in that yellow line in
6 2014, that's the 2014 summer spike, correct?

7 A. Do you mean the yellow diamonds?

8 Q. The trend line in the middle.

9 A. That's temperature.

10 Q. That's temperature.

11 And then you have the diamonds are the
12 water lead levels, right?

13 A. They are percentage of total elevated
14 blood lead.

15 Q. Right. And three of the four highest
16 levels are in the summer of 2014, correct?

17 A. Yes.

18 Q. The second highest level was in the summer
19 of 2015, correct?

20 MR. RINGSTAD: Objection; form.

21 BY THE WITNESS:

22 A. It is very similar.

23 BY MR. MORRISSEY:

24 Q. Certainly one of the four highest levels

1 Q. There was a summer spike in lead in
2 children's blood in the summer of 2015, correct?

3 A. One month, yes.

4 MR. RINGSTAD: Objection; form.

5 BY MR. MORRISSEY:

6 Q. And you also found a spike in water lead
7 levels in summer of 2015 as you said in your
8 conclusions, right?

9 A. The statement talks about both 2014 and
10 2015. It does not differentiate between the spike
11 level in 2014 and 2015. But, yes, generally the
12 statement is true.

13 Q. And your team conducted sampling of water
14 for lead in the summer of 2015, correct?

15 A. Yes.

16 Q. And as we've discussed, you found citywide
17 lead levels at 27 parts per billion, right?

18 A. 90th percentile, 27 ppb.

19 Q. Would you agree that the summer spike that
20 occurred in 2015 could have been avoided if the City
21 had switched back to Detroit water and implemented
22 corrosion control in February or March or April
23 of 2015?

24 MR. RINGSTAD: Objection to form, calls for

1 speculation.

2 BY THE WITNESS:

3 A. I don't know. Lead levels were pretty
4 stable in February until, like, May, June of 2015. So
5 I don't know.

6 BY MR. MORRISSEY:

7 Q. They went up over the summer, though,
8 right?

9 A. Yes, a couple of months.

10 Q. And you found that summer spikes didn't
11 occur after the City switched back to Detroit and
12 implemented corrosion control, correct?

13 A. Well, no, after switching back there was a
14 long stabilization period as it went up and down.

15 Q. After which the City reached historical
16 low levels in 2018 and 2019, right?

17 A. Eventually, yes.

18 Q. And all of the positive effects that
19 occurred from implementing corrosion control,
20 switching back to Detroit water, implementing a
21 flushing program, avoiding drinking lead-contaminated
22 water, replacing lead pipes, all of those things would
23 have occurred earlier if the City had started
24 implementing those things in February or March or

1 MR. RINGSTAD: Objection; form.

2 BY THE WITNESS:

3 A. The influent wastewater from industrial
4 was less than 5 percent and if they were -- they were
5 disproportionately releasing lead, it would have
6 easily impacted the linear regression, the R squared
7 would be a lot lower.

8 BY MR. MORRISSEY:

9 Q. And the -- the five metals that are
10 associated with lead in plumbing, are they also
11 associated with lead in industrial plumbing?

12 A. I mean, plumbing is, yeah, copper pipes,
13 lead pipes, and different from all of that.

14 Q. Let's go back to Exhibit 10, I believe.
15 It is the Pieper article.

16 Do you have the Pieper article there?

17 A. I do not.

18 Q. I am sharing on the screen Exhibit 10
19 which is the article you coauthored with Kelsey
20 Pieper, Environmental Science & Technology, published
21 in 2018, correct?

22 A. Yes.

23 Q. And if we turn to Page 8126, there is a
24 section in the article, No. 3. "Results During Height

1 of Crisis."

2 Do you see that?

3 A. I do.

4 Q. And you report in your article that:

5 "Although Flint reported compliance with
6 the LCR in 2014 and 2015, water lead results from our
7 survey of 268 homes in the first round of citizen led
8 sampling (August 2015) indicated that there was a
9 system-wide lead in water contamination problem."

10 Right?

11 A. At that time, yeah, that was true.

12 Q. And at that time was the summer of 2015,
13 right?

14 A. August 2015, yeah.

15 Q. You also found that the water lead levels
16 decreased after the switch to Detroit water and the
17 implementation of corrosion control, correct?

18 A. Over the five sampling rounds through
19 2017.

20 Q. Would you expect that Flint water was less
21 corrosive in November '16 than it was in August '15?

22 MR. RINGSTAD: Objection; form.

23 BY THE WITNESS:

24 A. It was Detroit water that had a lot more

1 article, correct?

2 A. Yes.

3 Q. And as an engineer, your duty is to make
4 sure water is safe if you are working on a water
5 distribution system, correct?

6 MR. RINGSTAD: Objection; form.

7 BY THE WITNESS:

8 A. To meet federal standards, unfortunately.

9 BY MR. MORRISSEY:

10 Q. Going back to Table 1, you have a list of
11 factors for both Washington, DC and Flint.

12 Do you see that?

13 A. I do.

14 Q. And in the bottom third of this table,
15 there is a heading "Unethical Behavior and
16 Accountability."

17 Do you see that?

18 A. I do.

19 Q. And you list various things, including
20 conduct by various government actors.

21 The last thing you list there under
22 Unethical Behavior and Accountability is: "Two
23 environmental companies sued."

24 Do you see that?

1 A. I do.

2 Q. That's a reference to the claims against
3 Veolia and LAN, correct?

4 A. I think so.

5 Q. And you haven't offered any opinion on the
6 relative responsibility of Veolia and LAN as compared
7 to any government actor, correct?

8 A. I have not.

9 Q. And any opinion on that would be a --
10 beyond the scope of what you've been retained to give,
11 correct?

12 A. Yes.

13 MR. MORRISSEY: I have nothing further for you
14 at this time, sir.

15 MR. RINGSTAD: Mr. Kent, any questions for the
16 witness?

17 MR. KENT: Let's take about a ten-minute break,
18 please, and then I'll -- I'll let you know.

19 MR. RINGSTAD: Great.

20 THE VIDEOGRAPHER: We are off the record at
21 6:09 p.m.

22 (WHEREUPON, a recess was had
23 from 6:09 to 6:19 p.m.)

24 THE VIDEOGRAPHER: We are back on the record at

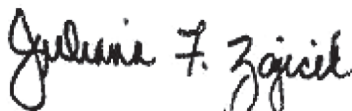
REPORTER'S CERTIFICATE

I, JULIANA F. ZAJICEK, a Registered Professional Reporter and Certified Shorthand Reporter, do hereby certify that prior to the commencement of the examination of the witness herein, the witness was duly remotely sworn by me to testify to the truth, the whole truth and nothing but the truth.

I DO FURTHER CERTIFY that the foregoing is a verbatim transcript of the testimony as taken stenographically by me at the time, place and on the date hereinbefore set forth, to the best of my availability.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney nor counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not interested directly or indirectly in the outcome of this action.

IN WITNESS WHEREOF, I do hereunto set my hand on this 24th day of May, 2023.



JULIANA F. ZAJICEK, Certified Reporter